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CASE REPORT

Thoracoscopic Thoracic Duct Ligation for Persistent Cervical Chyle Leak: Utility of Immediate Pathologic Confirmation

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ABSTRACT

Objective: Chylous fistulas can occur after neck surgery. Both nonoperative measures and direct fistula ligation may lead to fistula resolution. However, a refractory fistula requires upstream thoracic duct ligation. This can be accomplished minimally invasively. Success depends on lymphatic flow interruption where the duct enters the thorax. We report on the utility of frozen section confirmation in achieving this goal.

Methods: Persistent chylous fistulas occurred in 2 patients after left cervical operations. In the first patient, attempted direct fistula ligation and sclerosant application failed. Fasting, parenteral nutrition, and somatostatin-analog provided no benefit. For the second patient, nonoperative treatment was also ineffective. Prior radiation therapy and multiple cervical operations militated against attempted direct fistula ligation. Both patients underwent thoracoscopic thoracic duct interruption.

Results: In both cases, a duct candidate was identified between the aorta and azygos vein. Frozen section analysis of tissue resected between endoclips verified it as thoracic duct. Fistula resolution ensued promptly in both instances.

Conclusions: This report lends further credence to the efficacy of minimally invasive thoracic duct ligation in treating postoperative cervical chylous fistulas. Frozen section confirmation of thoracic duct tissue is useful. It allows one facile with thoracoscopy, but less familiar with thoracic duct ligation, to confidently terminate the operation.

Key Words: Chylous fistula, Frozen section, Ligation, Thoracoscopy.

INTRODUCTION

Lymphatic fistula remains a troublesome complication after neck and chest surgery. It follows injury to the thoracic duct or one of its major communicating branches. Nonoperative measures sometimes succeed, as does direct suture ligation with or without adjuncts (biologic glues, sclerosing agents), but upstream ligation of the thoracic duct is often the necessary remedy. Done minimally invasively, efficacy hinges on definitive vessel ligation. Frozen section analysis verifies thoracic duct tissue, allowing confident termination of the procedure. This is particularly helpful when mediastinal dissection has been difficult and there is any uncertainty as to visual identification of the thoracic duct.

CASE REPORTS

Case 1

A 58-year-old woman with left subclavian steal syndrome underwent unsuccessful angioplasty. Left carotid artery to subclavian artery bypass with a polytetrafluoroethylene graft followed. Three days later, cervical swelling prompted reexploration. Apparent lymphatic fluid collected, but no discrete fistula could be identified. Repair was attempted by suture placement near a suspected thoracic duct injury. Fibrin glue and aerosolized tetracycline were applied, and the wound was closed over a drain. Daily fluid output, high in triglycerides, exceeded 500mL. This persisted for 2 weeks despite fasting, intravenous alimentation, and an intravenous infusion of somatostatin-analog.

Right video-assisted thoracoscopic surgery (VATS) was performed with the patient under general anesthesia with a dual-lumen endotracheal tube to facilitate right lung deflation. Four ports were placed. An 11.5-mm trocar, placed approximately through the seventh intercostal space along the midaxillary line, admitted a 10-mm, 30-degree camera. Two 5-mm ports were placed along the midaxillary line 1 or 2 intercostal spaces above and below the camera port, respectively, to accommodate dissecting instruments. An additional 5-mm port was placed several centimeters anterior to the camera port to admit an atrau-

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matic instrument to retract the lower pulmonary lobe. Mediastinal adiposity complicated matters, but eventually a 2-mm to 3-mm diameter duct candidate was seen. Superoinferiorly oriented, it was pale yellow and slightly beaded. It was ligated with titanium vascular clips rostrally and caudally, and a 5-mm to 6-mm intervening portion was submitted for frozen section. Lymphatic duct tissue was confirmed. A small chest tube was placed via the camera port site and secured. Postoperatively, a marked decrease occurred in cervical drain output. Leakage resolved within a few days with the patient on a regular diet. She had no further complications.

Case 2

A 55-year-old man with tonsilar carcinoma was treated with chemotherapy and radiation followed by tumor resection. He presented with a recurrence above the left thoracic inlet. Repeat operation began with tracheostomy, and resection included the jugular vein near its subclavian confluence. The wound was closed in layers over a drain. Postoperative drainage turned chylous. It persisted above 100mL/day over a 2-week course of pressure dressings and dietary manipulation (medium chain triglycerides followed by parenteral nutrition).

Thoracic duct ligation by right VATS was attempted. Given the tracheostomy, a right bronchial blocker was used. Four airtight ports were placed for the camera and instruments, in positions similar to those used in the first case. Incomplete pulmonary deflation was overcome by low-flow pleural CO_2, yielding ideal conditions. Suprahiatal dissection between the aorta and azygos vein revealed a probable thoracic duct. It was doubly clipped above and below. Tissue in between was excised and confirmed on frozen section to be thoracic duct tissue. A small chest tube was placed. With the patient on a regular diet, the cervical drain output turned serous and diminished to below 50mL/day. Discharge occurred on postoperative day 5, neck drain in place. With negligible output after one week, the drain was removed without sequelae.

RESULTS

Both patients had a prolonged hospital course due to their persistent lymphatic leaks. Thoracoscopic surgery was well tolerated by both, and an uncomplicated, prompt return to an unrestricted diet was gratifying. Chyle fistula healing was complete, and neither patient had wound healing problems or other complications.

DISCUSSION

Cervicothoracic operations can be complicated by thoracic duct disruption. Lymphatic fistulas may persist despite conservative measures. Wound exploration with fistula ligation may also fail. Reports describe successful thoracoscopic thoracic duct ligation for postoperative chylothorax.[1–6] Similar results have been achieved robotically.[7] Cervical chylous fistulas have also responded to minimally invasive supradiaphragmatic thoracic duct ligation.[8,9]

Two methods of duct interruption are direct dissection and ligation[1,2,4–6,8] and en masse ligation of all tissue between aorta and azygos vein.[5,7] The former allows visual identification of the ligation target. The latter avoids structure delineation but potentially addresses accessory ducts. Usually, the duct runs along the spine anterior to right intercostal arteries and terminal hemiazygos vein branches.[10] In an autopsy series of 1081 cases, it was a single entity between the cisterna chyli and T8 vertebra in every instance.[11] A smaller postmortem series identified an accessory duct at or above T10 nearly one third of the time.[12] Based on clinical reports[8,9] and autopsy series,[11,12] we ligate the thoracic duct just above the aortic hiatus at the T10-T12 level.

The thoracic duct is more muscular than similarly sized veins.[12] Its intima is lined by endothelial cells that intermittently fold inward, forming characteristic valves. The media has substantial circular muscle with periodic discontinuity, giving the duct a beaded appearance. However, buried within mediastinal adipose tissue, the delicate duct may be elusive. Surgeons, though adept at thoracoscopy, may uncommonly address the thoracic duct. Therefore, we recommend immediate histologic verification of the duct candidate. We prefer confirmed ligation of a major lymphatic structure to mass tissue ligation.

There is potential for missing an accessory duct. This could also occur with right en masse ligation if the additional duct ascends in the medial left chest. Significance of all accessory ducts is uncertain, but failure of fistula resolution after confirmed duct ligation should prompt lymphangiography in search of a secondary duct. However, given the success of the primary right thoracoscopic approaches reported to date, we do not favor routine preoperative lymphangiograms.

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